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An Examination of Secondhand Smoke in a Sample of Atlanta Hospitality Venues and Their Compliance with the Georgia Smokefree Air Act

Eli W. Nachamkin
Institute of Public Health

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By

Eli Nachamkin

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Approval Page

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By Eli Nachamkin

Approved

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Committee Chair

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Committee Member

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Committee Member

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Author's Statement Page

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ABSTRACT

Introduction: Despite the known consequences of cigarette smoking, almost 20% of adults in the United States smoke. Smoking has been shown to harm nearly every organ of the body. Its detrimental effects have been seen not only in smokers themselves but also in those exposed to secondhand smoke (SHS) at work and in other public places.

Methodology: The purpose of this thesis was to examine compliance with the signage requirement of the Georgia Smokefree Air Act (GSAA) of 2005 among 99 hospitality venues located in Atlanta. Photographs of bars and restaurant entrances were taken and raters then classified each venue as compliant or non-compliant with smoking status signage requirements of the GSAA. Additionally, air samples were collected using Sidepak equipment from 59 venues in order to estimate the $PM_{2.5}$ levels, which is a recognized measure of air quality. With Spearman's rho correlation coefficient (r), analyses were run to determine correlations between signage compliance, number of cigarettes being smoked, and smoking permitted with air quality ($PM_{2.5}$). Analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 19.

Results: Of the 99 venues assessed, only 21 (21.2 %) complied with the signage requirements of the GSAA. Venues that do adhere to signage requirements and indicate no smoking on their signs and at the same time via telephone stated that smoking is prohibited had the lowest $PM_{2.5}$ levels $\bar{x}$=15.03. On the contrary, those venues that display signs permitting smoking and via telephone indicated smoking is allowed had the highest $PM_{2.5}$ levels $\bar{x}$=230.31. It was determined that there is a strong positive correlation between $PM_{2.5}$ and "number of cigarettes" ($r=.611$, $n=59$, $p<.001$) as well as moderate correlation between $PM_{2.5}$ and "smoking permitted" as indicated from phone calls ($r=.464$, $n=59$, $p<.001$). However, analysis showed a weak correlation between $PM_{2.5}$ and "signage compliance" in accordance with GSAA ($r=.107$, $n=59$, $p>.001$).

Conclusions: Enforcement of GSAA must be enhanced in order to better protect workers and patrons of Atlanta's bars and restaurants from harmful exposure to SHS. Findings from this study support that prohibiting smoking in bars and restaurants and having signs stating that smoking is prohibited would improve air quality and protect workers by eliminating their exposure to SHS while working.

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CHAPTER 1

Introduction

1.1: **Background**

Despite the known health consequences of smoking, an estimated 45.3 million people or 19.3% of all adults over the age of 18, still smoke in the United States (Centers for Disease Control and Prevention, 2012). The Georgia statistics closely mimic those of the United States with 19.5% of all Georgians over the age of 18 still smoking (CDC, 2011). That means 1,393,000 Georgian citizens are risking their health and the health of those around them every day. Out of the 50 states, Georgia ranks 32nd for percent of the population still smoking.

There are a myriad of health consequences as a result of smoking and numerous public agencies have worked to educate the public on the adverse effects of smoking, yet tobacco use remains the leading preventable cause of disease and death in the United States. It causes about 440,000 deaths each year and costs the country about $157 billion in health related losses each year (United States Department of Health and Human Services, 2011). Nationally, smoking causes greater than 5.6 million years of potential life lost each year. In Georgia, during the years 2000-2004, over 10,500 adults aged 35 and older died as a result of tobacco use each year (CDC, 2011).

Smoking has been shown to harm nearly every organ of the body (DHHS, 2011). In terms of specific health related consequences, smoking is estimated to increase the risk of coronary heart disease and stroke by two to four times. It increases the odds of a man developing lung cancer by twenty-three times and it increases a woman's chance of developing lung cancer by thirteen times. It also increases the chances of dying from chronic obstructive pulmonary disease (COPD), including bronchitis and emphysema by twelve to thirteen times (CDC, 2011). Additionally, smoking has also been directly associated with a number of other cancers, including esophageal, bladder, cervical, kidney, larynx, throat, pancreatic, and stomach (DHHS, 2011).

The health effects of smoking are not only seen in the adult population. Cigarette smoking during childhood and adolescence has been shown to cause significant health problems to young people including increased incidence and severity of respiratory illness, increased incidence of cough, a worse cholesterol profile, decreased physical fitness, and possible decreased lung growth and function (Repace & Lowrey, 1982).

1.2 **Purpose of the study**

The purpose of this thesis is to examine the relationships between indoor air quality and compliance with Georgia Smokefree Air Act.

1.3 **Research Questions**

1. To what degree are hospitality venues compliant with signage requirements?

2. Is signage compliance correlated with $PM_{2.5}$ levels in venues?

3. How does number of cigarettes burning associate with $PM_{2.5}$ levels?

4. Is there a correlation between smoking status and $PM_{2.5}$ levels?

CHAPTER II

Secondhand Smoke and Literature Review

2.1 Secondhand Smoke

Secondhand smoke (SHS), also known as environmental tobacco smoke (ETS), is the only agent ever classified by the EPA as a known human carcinogen for which an increased risk has actually been observed at typical environmental levels of exposure (Brownson, Eriksen, Davis & Warner, 1997).

Smokers themselves are not the only ones affected by cigarette smoke. Secondhand smoke is a mixture of the smoke given off by burning the end of a cigarette, pipe, or cigar, and the smoke exhaled by smokers (United States Environmental Protection Agency, 2011). Secondhand smoke contains more than four thousand substances, many of which are known to be toxic substances, hazardous air pollutants, and carcinogens to humans and animals (Brownson et al., 1997; EPA, 2011). Secondhand smoke causes serious health effects to children and adults. Because children are still developing, have increased rates of respiration, and have less control over their environments, they are at increased risk of detrimental effects of secondhand smoke. The more a child is exposed to SHS, the greater their risk of suffering serious health consequences. Ninety percent of children are exposed to secondhand smoke as a result of their parents smoking habit. Secondhand smoke has been linked to causing asthma, triggering asthma

attacks, worsening the severity of asthma symptoms, increasing the risk of sudden infant death syndrome, increasing the risk of lower respiratory infections including pneumonia, increasing the incidence of middle ear infections, and decreasing lung function. Secondhand smoke is the third leading preventable health hazard following active smoking and alcohol (American Cancer Society, 2012). It is responsible for 50,000 deaths a year in the United States.

Adults are also affected by smoking even if they do not smoke. Exposure to SHS has been shown to cause lung cancer in non-smoking adults (EPA, 2011). Approximately 3,000 lung cancer deaths per year are seen in non-smokers as a result of SHS. Environmental tobacco smoke also has significant effects on the respiratory health of nonsmokers, including increased phlegm production, increased coughing and decreased lung function (Brownson et al., 1997). Secondhand smoke exposure has also been linked to an increase risk of heart disease, strokes and heart attacks as it causes harm to the heart, blood vessels and blood circulation (American Cancer Society, 2006). Nonsmokers exposed to SHS have a 20% increase in heart disease risk (Brownsen et al., 1997). Pregnant women exposed to SHS are at an increased risk of having a spontaneous abortion, still-born birth, low birth weight baby, and other complications during pregnancy and delivery (American Cancer Society, 2012).

Exposure to SHS can occur in numerous places including ones home, the workplace, the car, and public places such as restaurants, schools, shopping centers, and public transportation (American Cancer Society, 2012). The risk of lung cancer is approximately 30% higher for nonsmoking spouses of smokers compared with nonsmoking spouses of nonsmokers (Brownson et al., 1997). While over three-fourths of white collar workers are protected from SHS by smoke-free policies, only fifty-two percent of blue collar workers and less than fifty percent of food service workers are fortunate enough to be protected from SHS by such policies (Repace, 2006).

The hospitality industry, including bars, restaurants, nightclubs, bowling alleys and gaming facilities, is one of the main sources of air pollution from SHS.

The 1988 National Health Interview Survey showed that 36.5% of the 79.2 million US nonsmokers worked in places that allowed smoking (Brownson et al., 1997). Other US data showed that 37% of the nonsmoking US population lived in a home with at least one smoker or was exposed to ETS at work. Among these nonsmoking individuals, 88% had detectable serum cotinine levels. Cotinine is a principal metabolite of nicotine but with a substantially longer half-life so it is commonly used to measure tobacco use status or tobacco exposure (American Association of Clinical Chemistry, 2012). Similar results were seen in a study of 663 nonsmokers attending a cancer screening. Seventy six percent reported ETS exposure in the four days preceding the screening, with the workplace and the home being the primary sources of exposure to ETS in this study (Brownson et al., 1997). In another study, 881 nonsmoking employees working in workplaces that allowed smoking were assessed for exposure to ETS and compared with nonsmoking workers in venues with smoking bans. The nonsmoking employees who worked in venues allowing smoking were more than four times as likely to have detectable saliva cotinine concentrations compares to those working on venues that banned smoking.

2.2 Studies

In 2003 the state of New York implemented the Clean Indoor Air Act (CIAA) in an attempt to reduce exposure to ETS in indoor public places (Abrams, Mahoney, Hyland, Cummings, Davis & Song, 2006). Following implementation of this act, a cross-sectional study including 168 non-smoking workers was conducted. The workers were classified in 3 groups:

non-casino hospitality workers (employed in bars, restaurants, bingo halls and bowling alleys), casino workers, and non-hospitality workers. The objective of the study was to compare the differences in sources of exposure and levels of exposure to ETS among both hospitality and non-hospitality workers, both before and after this act. Environmental tobacco smoke exposure was determined by pre and post-law interviews and urine samples assessing for cotinine, a biomarker of ETS exposure. Among the non-casino hospitality workers there was a 70% reduction in exposure to ETS. Among both non-casino hospitality workers and non-hospitality workers the proportion of non-detectable cotinine levels increased significantly from pre-law to post law: 3% to 62% in the non-casino workers and 20% to 63% in the non-hospitality workers. In addition, urine cotinine values decreased significantly from pre-law to post-law in these two groups. The findings from this study show that as a result of the CIAA both self-reported exposure to ETS and measured urine cotinine levels were markedly reduced.

The state of Virginia regulates outdoor air pollution under the Virginia code, however, the state does not regulate indoor air quality (Repace, 2006). In a study, 12 indoor venues, 19 outdoor locations, and 5 transit related locations were evaluated for their air quality using a SidePak monitor to measure fine particle concentrations. Eleven of the 12 indoor venues permitted smoking. Within each venue, staff and volunteers recorded the number of patrons and the number of burning cigarettes every 10 minutes for at least 30 minutes. The length, width, and height of each venue was also collected as the researchers hypothesized that concentrations of SHS are directly proportional to the smoker density and inversely proportional to the air exchange rate. Knowing that SHS contributes to about 90% of respirable particles (RSP) and carcinogenic particulate polycyclic aromatic hydrocarbons (PPAH) in bars, RSP data was collected at each venue. The mean RSP level of the indoor smoking venues was 178μg/m^3. The

RSP levels ranged from 83 µg/m^3-680 µg/m^3 for indoor venues. Every single one of the 11 indoor venues that allowed smoking had air levels so polluted from SHS that Occupational Safety and Health Administration's (OSHA) Significant Risk of Material Impairment of Health level of one death per thousand workers per working lifetime of 45 years was exceeded. When that level is exceeded, significant risk on employee health is noted, including serious irreversible morbidity as well as mortality; thus, the working conditions are not safe or healthful (United States Department of Labor, 1993). Using the air quality index (figure 2), only the one indoor venue that prohibited smoking had good air quality (Repace, 2006). Of the 11 indoor venues that allowed smoking, one venue was consistent with Significant Harm to human health, 4 were Very Unhealthy, 3 were Unhealthy, and 3 were Moderate. Comparatively, all outdoor and transit related locations had Good air quality. This study demonstrates that Virginia's failure to implement a smoke-free workplace law has poor consequences for its nearly 4 million workers.

A study conducted in Menlo Park, California compared indoor air quality before and after a public smoking policy was implemented on May 1st 1994 prohibiting smoking in all taverns within the city limit (Ott, Switzer & Robinson, 1996). Once this regulation went into effect, a "No Smoking" sign was posted on each tavern door and all smoking inside the taverns was banned. Before smoking was prohibited, 26 visits were made to a crowded sports tavern and RSP concentrations were gathered. Following the smoking prohibition, 50 visits were made to the same sports tavern to measure changes in RSP levels. During each visit, the numbers of persons present and the number of cigarettes being smoked were documented at regular intervals. Additionally, the successive indoor RSP concentrations, and the outdoor RSP concentrations were recorded. RSP measurements were collected with the Model 8510 piezobalance, a portable instrument designed to measure the mass concentration of particles using a piezoelectric

microbalance sensor. This instrument has been used for many years to measure cigarette smoke in indoor settings. During the 2 year smoking period, the average indoor RSP concentration was 83.0µg/m^3. The average outdoor concentration during that time was 26.1µg/m^3. To find the average RSP contributed by sources within the tavern, such as smoking and cooking, an indoor-minus-outdoor (I-O) calculation was performed. The I-O mean RSP concentration preceding the smoking prohibition was 56.8ug/m^3. The I-O mean RSP concentration following the smoking prohibition was 9.4ug/m^3. The difference between the two IO measurements (pre and post the smoking ban) was 43.9ug/m^3, an average of 1.17 cigarettes per tavern attendee. These findings showed that smoking contributed to about 80% of the total indoor RSP concentration, leaving 20% a result of other sources, such as cooking. Other studies have shown similar findings, such as 67% of the RSP in a dinner theatre and 89% of the RSP in a bingo hall being from smoking (Repace & Lowrey, 1982). Although the average smoking level was low (1.17 cigarettes/attendee), RSP concentrations decreased significantly after the prohibition of smoking (Ott et al., 1996). Prior to the smoking ban the indoor RSP concentration was 56ug/m^3 higher than the outdoor concentrations, and following the ban indoor levels were only 5.9ug/m^3 higher than outdoor levels, a 90% decrease.

2.3 RSP Discussion

While implementing a no-smoking policy inside hospitality venues is one way to improve indoor air quality, Repace (2006) also conducted a study on the air-exchange rate that would be required to produce acceptable air quality without prohibiting smoking. He found out that a tornado-like 121,500 air changes per hour would be needed to achieve acceptable indoor air

quality via ventilation technology. This impossible task shows the importance of smoking bans as the only possibility to improve indoor air quality.

A big concern for hospitality venue owners is that prohibiting smoking in the venues may cause a loss in patron attendance and thus a loss in profit. However, the Ott et al. (1996) study also investigated the impact a no-smoking regulation had on tavern attendance. Prior to the regulation, the average attendance was 40.7 persons. Following the ban, the average attendance was 41.9 persons. Thus, there was no decline in tavern attendance after the nonsmoking rule went into effect. It was noted that smoking patrons continued to go to the tavern but just went outside periodically to smoke. Nonsmoking patrons commented that they were relieved by the noticeably cleaner air.

2.4 Policies

There are a myriad of reasons to restrict smoking in public areas, including its impact on chronic disease, its cost to employers and society, and ETS being deemed a carcinogen. Government efforts to regulate exposure to ETS have occurred at the federal, state and local levels (Brownson et al., 1997). At a federal level, smoking has been banned on airline flights, in federal office buildings, in the White House and in childcare facilities that receive federal funds.

After the release of the 1986 Surgeon General's report, more local ordinances to restrict smoking occurred (Brownson et al., 1997). By 1988, nearly 400 local ordinances were passed. Such ordinances were enforced by health departments, boards of health, city managers, police departments, environmental health agencies and fire departments.

In 1994, OSHA estimated that 13,000 nonsmoking workers died each year as a result of SHS on the job and proposed a rule to ban smoking in all workplaces (Repace, 2006). However, Congress felt this was an issue best handled by each individual state and discouraged proceeding with this rulemaking.

In 1995, California was the first state to implement a smoke-free restaurant law and ban smoking in many public places (Cowling & Bond, 2006). As of June 30, 1995, forty-six states and the District of Columbia required smoke-free indoor air to some degree or in some public places, though the state restrictions varied greatly (Brownson et al, 1997). Soon after in 1998 California then implemented a smoke-free bar law. The goal of these laws was to reduce the susceptibility of bar and restaurant employees to respiratory and heart diseases as a result of secondhand smoke (Cowling & Bond, 2006).

In 2005, Governor Sonny Perdue signed the Georgia Smokefree Air Act into law, and this became effective the first of July in 2005 (North Georgia Health District, 2012). This law prohibits smoking inside most public areas and outlines specific guidelines for allowing smoking in and around establishments that serve the public. The law prohibits smoking in state buildings and all enclosed areas within places of employment, except those exempt by the law (Georgia General Assembly, 2006).The purpose of this act is to limit the exposure Georgia citizens have to SHS, thus improving the health, comfort and environment of state adults, children and employees (Georgia Smokefree Air Act of 2005, 2005). This act requires that specific signage stating the venue's smoking status, such as 'No Smoking,' showing the universal 'No Smoking' symbol, 'Smoking Permitted,' 'Smoking Permitted, No One Under the Age of 18 Allowed,' and 'No Smoking Beyond this Point' shall be noticeably posted, and shall not be concealed in any way. It also explains that persons violating this code will be punished with a fine (Georgia

General Assembly, 2006). However, Georgia's law has exemptions that allow smoking to continue in some public locations, such as bars and restaurants that do not serve minors, and privately owned rooms used for private functions in which minors are not attending. In addition to state ordinances, local and county governments in Georgia have the authority to regulate smoking and implement more stringent rules than the state. Fulton County, however, does not have any ordinances to ban smoking in bars, restaurants or workplaces (Fulton County Department of Health and Wellness, 2003).

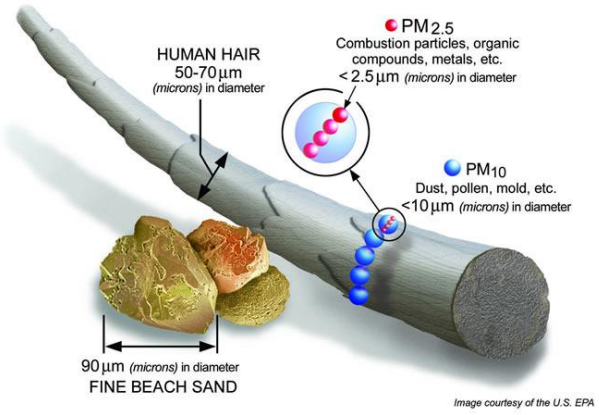
Similar to how smoking restrictions increased in bars and restaurants over the years, the percentage of United States workplaces with total smoking bans increased substantially from 1986-1991 from 2 to 34% (Brownson et al, 1997). Such workplace smoking bans have been effective in reducing non-smokers exposure to ETS as measured by perceived air quality in the workplace following such bans and by active measurement of nicotine vapor. Both 1 and 8 months after a smoking ban was instituted at John Hopkins Medical Institute, nicotine vapor concentrations declined so significantly that in most areas nicotine concentrations were below the detectable level of 0.24mg/m^3. In a study comparing Massachusetts workplaces that allowed smoking to those that prohibited it, nicotine concentrations varied from 8.6 to .3ug/m^3. Not only do workplace smoking bans decrease exposure to ETS but US population based studies have also shown that smoking bans reduce smoking prevalence and daily smoking consumption by 10%. Smoking bans were associated with lower smoking rates and higher proportions of people quitting smoking. Furthermore, the United States Environmental Protection Agency (EPA) analysis concluded that a national ban on smoking in the workplace would reduce costs to employers by $39-72 billion a year, including but not limited to decreased fire risk, damage to property, worker's compensation, disability, absenteeism, and productivity losses.

2.5 Particulate Matter

Particulate matter is a type of air pollution composed of various particles in the air that range in size and shape (EPA, 2012). Smaller particulate matter, 10 micrometers in diameter or smaller, is especially concerning to the EPA, as these particles are small enough to be inhaled and lodge deep in the respiratory system, causing serious health effects. Fine particles, PM2.5, represent solid particles and liquid droplets with a diameter of ≤ 2.5 micrometers. (Figure 1) Such fine particles pose the largest health risks. Studies have shown that exposure to these fine particles worsens pre-existing respiratory and cardiovascular disease and causes premature mortality, lung disease, heart attacks, and cardiac arrhythmias. Particulate matter of this small size compromises the majority of components of cigarette smoke (EPA, 2008). The small size of many of the particulate components of tobacco smoke allows them to be drawn into the lungs of nonsmokers (Brownson et al., 1997).

Figure 1:

How Big is Particulate Matter$_{2.5}$



http://www.epa.gov/pm/basic.html

The EPA calculates an air quality index based on six major air pollutants considered harmful for the public health and the environment (Figure 2) (Air Now, 2011). $PM_{2.5}$ is one of

the six pollutants measured. The EPA's 24 HR Air Quality Index ranks $PM_{2.5}$ concentrations (ug/m^3) according to the potential to affect public health. The index has 6 levels of air quality: 'Good' has a $PM_{2.5}$ concentration of ≤ 15, 'Moderate' has a $PM_{2.5}$ concentration of 16-35, 'Unhealthy for Sensitive groups' has a $PM_{2.5}$ concentration of 36-55, 'Unhealthy' has a $PM_{2.5}$ concentration of 56-150, 'Very Unhealthy' has a $PM_{2.5}$ concentration of 151-250, and 'Hazardous' has a $PM_{2.5}$ concentration of ≥ 250 . Figure 2 depicts the EPA's air quality index values.

Figure 2:

Air Quality Index Values

Air Quality Index (AQI) Values	Levels of Health Concern	Colors	
When the AQI is in this range:	*..air quality conditions are:*	*...as symbolized by this color:*	Meaning
0-50	Good	Green	Air quality is considered satisfactory, and air pollution poses little or no risk
51-100	Moderate	Yellow	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
101-150	Unhealthy for Sensitive Groups	Orange	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151 to 200	Unhealthy	Red	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
201 to 300	Very Unhealthy	Purple	Health warnings of emergency conditions. The entire population is more likely to be affected.
301 to 500	Hazardous	Maroon	Health alert: everyone may experience more serious health effects

http://airnow.gov/index.cfm?action=aqibasics.aqi

To measure the air quality in this study, TSI SidePak® AM510 Personal Aerosol Monitor (TSI, Inc., St. Paul, Minnesota) was used. This monitor uses a built in sampling pump to draw air through a laser. The particles in the air scatter the light of the laser and the monitor measures the mass concentration of respirable suspended particles in micrograms per cubic meter based on the amount of scattering. These types of monitors display aerosol concentrations real-time. This study measured a specific type of aerosol, tobacco smoke, in public hospitality venues. $PM_{2.5}$

was the target of interest since it is the major component of cigarette smoke, hence making it a sensitive marker of tobacco smoke in the air.

Chapter III

Methods and Procedures

3.1: Study Population

A list of bars, restaurants, clubs, taverns and other hospitality venues within Fulton County, Georgia that were sold a license to serve alcohol in 2011 was obtained from the Georgia Department of Revenue. The list contained 1,040 licenses. The sample size was then narrowed down to those within the city of Atlanta appropriate for air testing. Additionally, all strip clubs and liquor stores were eliminated from the list, leaving 99 venues in the sample population. (Table 7) Each of these locations was contacted by telephone to verify whether or not smoking was allowed on the premises. The respondents provided one of two answers: yes (1) or no (0).

3.2 Venue Photographs

The 99 venues were each visited and a photo of the entrance was taken, including any smoking signage visible at the entrance, using a Canon PowerShot SD 1200 IS digital camera. The same person took each photo. Venues in the same area of town were typically visited on the same day and all of the pictures were taken within three weeks. Each photo was coded so it could be matched with SidePak and field note data. The intent of the photo was to verify compliance

with signage of smoking status according to Georgia Legal Code 290-5-61-.05 Signage of the Georgia Smokefree Air Act of 2005 (Georgia Smokefree Air Act of 2005, 2005). Independent reviewers rated whether or not signage requirements were met by indicating 'N' for non-compliance and 'Y' for compliance. Compliance was met if 'no-smoking' signs were visible on an entrance or in a place visible at entry into the place, and if the words on the sign were at least 1.5 inches in height (Table 7). Additionally, if a venue permitted smoking, a sign stating 'Smoking Permitted, No One Under the Age of 18 Allowed' had to be posted in order to be in compliance. In addition to visiting each venue to capture whether smoking signage was displayed, 59 venues were visited to collect air quality data. (Table 8)

3.3: Data Collection and Training

Georgia State University conducted a 3-hour training for volunteers on Friday, May 17th 2012 in order to show them how to properly use a TSI SidePak® AM510 to measure air quality in various Atlanta hospitality venues. The training was performed by Paul Mowery, a well-known secondhand smoke researcher who currently works at the Centers for Disease Control and Prevention (CDC) in the tobacco division.

After the training, volunteer pairs returned on the nights of May 17th and 18th for venue assignments. They were sent to the venues with the SidePak hidden within a bag, and entered the establishment as a customer making a purchase. However, if the volunteers were asked what they were doing, they were truthful about their reason for being there. While at each establishment the team took note of whether there was smoking signage outside of the establishment, the total number of occupants inside the establishment, the number of burning cigarettes, and other

evidence of smoking such as ashtrays and cigarette vending machines. They also noted if fans, hookahs or open flame cooking was occurring within the venue. Counting the number of occupants inside the establishment and the number of burning cigarettes was repeated every 10 minutes until the volunteers exited the establishment. The volunteers were inside each establishment for at least 30 minutes, and collected three different occupancy counts and lit cigarette counts, which were averaged to obtain the mean occupancy and mean number of burning cigarettes per venue. While inside, the SidePak ran continuously, taking real-time measurements of $PM_{2.5}$ and other respirable suspended particulates. Indoor air was sampled by the SidePaks at one-second intervals and the average recorded at one-minute intervals. At the end of the field visits, the volunteers dropped off the packs at GSU where the data was downloaded, and the field notes were entered and saved for data analysis. The field note template completed for each venue can be seen in Figure 3.

Figure 3:

Field Note Template Completed at Each Venue

Location Name:		
Entry Time:		
Exit Time:		
Brick Oven:		
Candles:		
Hookah:		
Cigars:		
Open Doors/Windows:		
Fans:		
Signage:		
Time	# People	# Cigs

3.4: Statistical Analysis

All sampling and collected data was compiled and organized into a single table (see Table 1) for statistical analysis with the Statistical Package for the Social Sciences (SPSS) ® versions 19-21. Photographic compliance data was coded 0 or 1; 0 being not compliant and 1 being compliant. Similarly, telephone responses to smoking status were coded 0 or 1; 0 being nonsmoking and 1 being smoking. All other variables were the averages of the data gathered during the air quality visits: Mean $PM_{2.5,}$ Average # People, and Average # Cigarettes. The subsequent outcomes will be further discussed in the following chapter for results.

To begin, tests of normality were performed to determine whether the data had a normal distribution. The result would determine what statistical correlation test should be used; parametric (for a normal distribution) or nonparametric (for a not-normal distribution). The tests of normality indicated that the data had a non-normal distribution, so a nonparametric test (Spearman's rho) was used to calculate correlations between $PM_{2.5}$ and the other collected variables of interest to answer the research questions.

Table 1

Atlanta Bars Air Sample Data Set Example

Smoking Permitted (phone call)	Mean $PM_{2.5}$ (ug/m^3)	Average # Cigarettes	# Sample Minutes	Signage
1	261.85	18	31	0
1	62.804	80	37	1
0	51.045	0	30	0
0	10.126	0	30	0
1	55.072	4	29	0
0	13.102	0	34	1

CHAPTER IV

Results

4.1 Data Collection Results

While 99 venues were selected for sampling, only 59 venues were included in this study due to multiple limitations including limited SidePak monitors available for rent, the cost of shipping and renting monitors, the ability to obtain enough volunteers, the cost of transportation, and machine batteries failing.

Of the fifty-nine venues sampled, the mean time spent in each venue was 36.9 minutes, with a range of 24 to 81 minutes. Of the fifty-nine establishments, 42 permitted smoking while 17 did not allow smoking per the pre-visit phone call. Burning cigarettes were noted in 37 establishments, while 22 venues had no burning cigarettes sighted. In the establishments that did not permit smoking the average number of burning cigarettes was 0.19, with a range of 0 to 3.3 cigarettes. In the establishments allowing smoking, the average number of burning cigarettes was 4.97, with a range of 0 to 80 cigarettes. The average $PM_{2.5}$ levels for establishments that did not allow smoking was 29.27ug/m3, compared to an average $PM_{2.5}$ level of 93.94ug/m^3 in the establishments that permitted smoking. (Table 2)

Table 2			
Smoking vs. Non-Smoking Venues and their $PM_{2.5}$ levels			
Smoking Status Per Pre-Visit Call	**Number Of Venues**	**Average # of Burning Cigarettes**	**Mean $PM_{2.5}$ (ug/m^3)**
Smoking Permitted	42	4.97	93.94
Smoking Prohibited	17	0.19	29.27

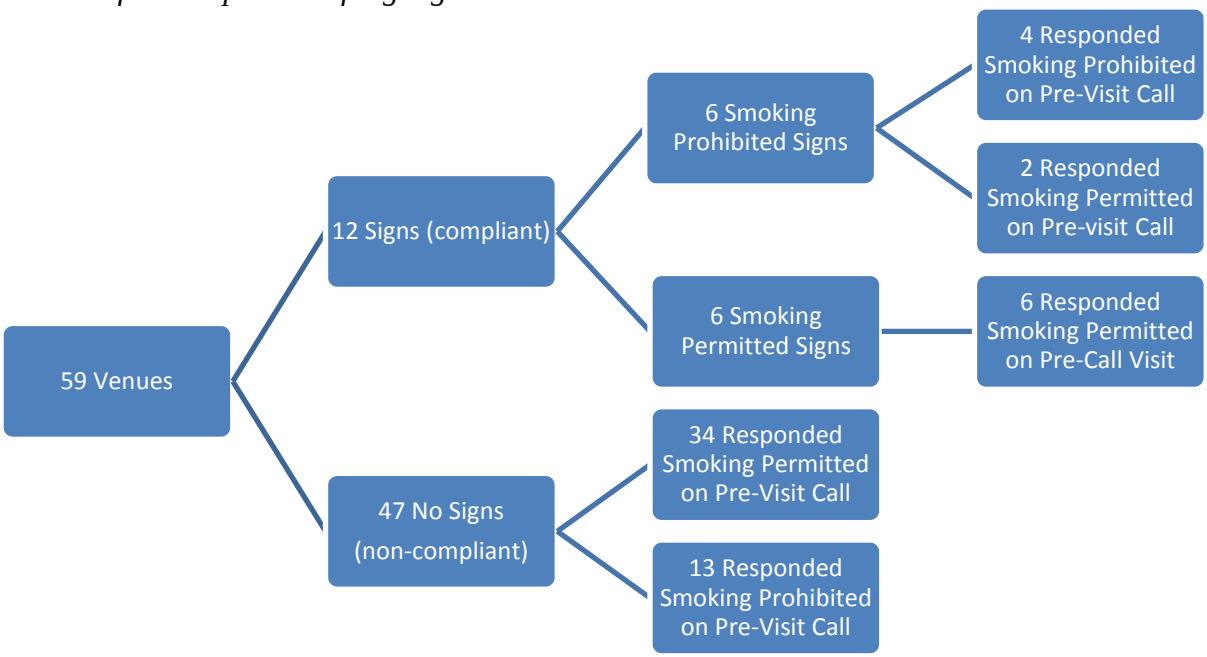
During the pre-visit calls to each establishment, 42 of the fifty-nine establishments said they do allow smoking inside their venue, while 17 said that smoking was not permitted. However, when pictures were taken of the entryways of each establishment, only 12 of the fifty-nine establishments had signs posted on their entryway stating their smoking status. Six of these 12 establishments had signs stating that smoking was not permitted inside the venue and 6 had signs stating that smoking was permitted. (Figure 4)

Of the six establishments that had signs stating no smoking, four of them also stated on the phone that they did not allow smoking. However, two of venues that displayed a no-smoking sign told us over the phone that they allowed smoking.

Of the 47 establishments that did not have signs on their entryway showing their smoking status, 34 stated in the pre-visit phone call that they did allow smoking, while the other 13 stated on the phone that they did not allow smoking.

Figure 4:

Flow Chart for Compliance of Signage and Calls



Of the 17 venues who stated during the pre-visit call that they do not allow smoking, only four had signs showing that smoking was prohibited. Of the same 17 venues who stated on the pre-visit call that they do not allow smoking, only one was found to have cigarettes burning during the air quality testing.

Of the 42 venues who stated on pre-visit call that they did allow smoking, 8 of them had signs on their entry-way notifying patrons of their smoking status. Six of these 8 venues had signs stating that smoking was permitted inside the establishment, while 2 of the venues had signs that stated smoking was prohibited. The remaining 34 venues who stated they allowed smoking in the pre-visit phone call did not have signage in their entryway notifying patrons of their smoking status.

4.2 Statistical Analysis Results

Statistical analysis began with determining whether or not the data had a normal distribution, as mentioned in the methodology. The tests of normality indicated that the distribution of the sample was significant, $p<.05$. Therefore the distribution is significantly different from a normal distribution.

Table 3:

Test of Normality

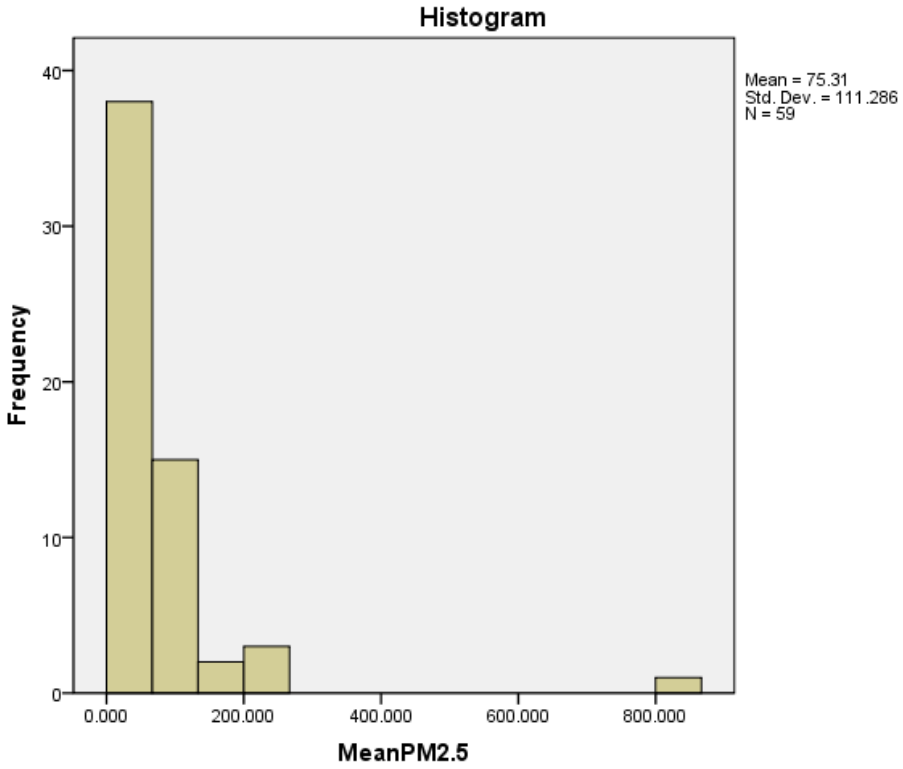
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Mean $PM_{2.5}$	0.262	59	0	0.493	59	0

a. Lilliefors Significance Correction

A histogram depicting the distribution of data for variable Mean $PM_{2.5}$ is provided in Figure 5.

Figure 5:

Non-normal Distribution



Since the data does not have a normal distribution, a nonparametric test was used to determine correlations. Spearman's rho test does not rely on the assumptions of a parametric test such as having a normal distribution, and measures the strength of the correlation between two variables. Spearman's rho test was used to determine the correlation between mean $PM_{2.5}$ levels and venues' smoking status as indicated via telephone. The statistical output indicated there is a moderate positive correlation between the 2 variables ($r=.464$, $n=59$, $p<.001$). The correlation between mean $PM_{2.5}$ levels and average number of burning cigarettes per venue was also tested. It was determined that there is a strong positive correlation between the two variables ($r=.611$, $n=59$, $p<.001$). The final correlation test was run between $PM_{2.5}$ and signage compliance outside the venue. The test result showed a weak correlation between the data ($r=.107$, $n=59$, $p>.001$). These results are shown in the following table:

TABLE 4

Spearman's rho Correlation

VARIABLE		**Mean $PM_{2.5}$**	**Smoking Status**
Mean $PM_{2.5}$	Correlation Coefficient	1	.464**
	Sig. (2-tailed)	.	.000
	N	59	59
Smoking Status	Correlation Coefficient	.464**	1
	Sig. (2-tailed)	.000	.
	N	59	59
		Mean $PM_{2.5}$	**Average # Cigarettes**
Mean $PM_{2.5}$	Correlation Coefficient	1	.611**
	Sig. (2-tailed)	.	.000
	N	59	59
Average # Cigarettes	Correlation Coefficient	.611**	1
	Sig. (2-tailed)	.000	.
	N	59	59

		Mean $PM_{2.5}$	**Signage Compliance**
Mean $PM_{2.5}$	Correlation Coefficient	1	0.107
	Sig. (2-tailed)	.	0.418
	N	59	59
Signage Compliance	Correlation Coefficient	0.107	1
	Sig. (2-tailed)	0.418	.
	N	59	59
**. Correlation is significant at the 0.01 level (2-tailed).			

CHAPTER V

CONCLUSIONS

Environmental tobacco smoke has been shown to harm every organ of the body. Its health-related consequences have been proven in both smokers and those persons exposed to SHS. Government efforts to regulate exposure to ETS have occurred at the federal, state and local levels.

In Georgia, the Smokefree Air Act of 2005 was enacted to protect the citizens of the state, including children, adults and employees, from the harmful consequences of tobacco exposure by limiting their exposure to SHS in most places where the public is permitted. In addition to state ordinances, some local and county governments in Georgia have further regulated smoking in public places by implementing more stringent rules than the state. Fulton County, however, does not have any ordinances to ban smoking in bars, restaurants or workplaces.

This study assessed to what degree 59 Fulton County venues, including 1 club, 8 taverns and 50 restaurants complied with the Georgia Smokefree Air Act. During the pre-visit calls to each of the 59 venues in this study, 42 of the 59 establishments said they do allow smoking inside their venue, while 17 said that smoking was not permitted. Despite the venues having

specific smoking rules, only 12 had signage in the entryways to their establishments indicating their smoking status, as required by the Georgia Smokefree Air Act signage section. The remaining 47 venues did not comply with the Georgia Smokefree Air Act. (Figure 4)

Of the 12 establishments that had signs, 6 of them had signs stating that smoking was not permitted inside the venue and 6 had signs stated that smoking was permitted. Of the 6 establishments that had signs stating smoking was prohibited, four of them also stated on the phone that they did not allow smoking. However, the fifth and sixth venue that displayed a no-smoking sign told us over the phone that they allowed smoking, and did have cigarettes actively burning in their establishments at the time of the air quality measures.

Of the 6 venues with "no smoking" signage, the mean cigarettes being burned was 0.988 and the average $PM_{2.5}$ was 37.71. In contrast, of the 6 venues that had signs permitting smoking and had smoking actively occurring in their restaurant, the average number of cigarettes/cigars burning was 18.85 and the average $PM_{2.5}$ was 230.313, a 6-fold increase from the venues prohibiting smoking.

Of the 47 establishments that did not have signs on their entryway showing their smoking status, 34 stated in the pre-visit phone call that they did allow smoking, while the other 13 stated on the phone that they did not allow smoking. Of the 34 venues that said smoking was permitted on the phone, 29 had active smoking occurring at the time of air quality measurements. The average number of cigarettes burning was 2.65 with an average $PM_{2.5}$ of 71.98. Of the 13 venues that said smoking was prohibited on the pre-visit call, one establishment had smoking occurring inside the premise. The average number of cigarettes in the venues that stated smoking was prohibited on pre-visit call was 0.25 and the average $PM_{2.5}$ was 33.65.

The venues with the fewest number of cigarettes burning and the lowest $PM_{2.5}$ were the venues with no smoking signs and who also reported "no smoking" on the pre-visit call. In contrast, the venues with signs permitting smoking and who also reported smoking was allowed on the pre-visit call had the highest number of cigarettes burning and the highest $PM_{2.5}$ levels.

The results of this study are surprising because only 12 of the 59 venues are compliant with the signage requirements for the Georgia Smokefree Air Act. It is also surprising that two venues had signs prohibiting smoking, yet the employee over the phone said smoking was allowed inside, and there were patrons actively smoking inside the establishments. Additionally, the venue with the highest $PM_{2.5}$, 804.207, was a venue that had only cigars being smoked, and only 12 cigars. Another unforeseen finding was that several establishments that allowed smoking and had active burning cigarettes had lower $PM_{2.5}$ levels than other establishments that prohibited smoking and had no actively burning cigarettes. This can possibly be explained by the fact that these establishments had more open flame cooking or other sources of $PM_{2.5}$.

While the intent of the Georgia Smokefree Air Act of 2005 is to protect the health of Georgia citizens, it is apparent that this act is not doing enough to protect the citizens from exposure to SHS. At a local and county level, this act needs to be better enforced, so that venues not meeting the signage requirements are penalized. The penalties for venues not meeting the requirements need to be harsh, so that venue owners comply. Also, additional county laws prohibiting smoking in public places need to be enacted and enforced at the county level. Furthermore, Fulton County should establish a $PM_{2.5}$ requirement for all public places and have this level checked annually as part of restaurant safety inspections. Similar to restaurant safety ratings, this $PM_{2.5}$ should be public knowledge posted in each venue.

Future areas that could be explored to help Fulton County enact legislation would be to study the compliance of venues located in other counties in Georgia that do have county laws prohibiting smoking in public and see if such laws are better followed and if $PM_{2.5}$ levels improved with increased compliance. Additionally, studies should assess whether venues with strict "no-smoking" policies have a greater impact on the smoking behaviors of their employees, both inside and outside of work. Studies should also be conducted to assess the knowledge of venue owners regarding state and local regulations for smoking in public hospitality venues, as not all owners may be aware of the specific requirements.

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Appendix A: Tables

Table 5

Atlanta Venue Photographic Compliance

Retailer	Address	Signage (Y/N)	Picture	Time
NORTH HIGHLAND PUB	469 N HIGHLAND AVE NE	N	410	6:28PM 7/1
MANUELS TAVERN	602 N HIGHLAND AVE NE	N	403-404	6:12PM 7/1
THE LOCAL	758 PONCE DE LEON AVE NE	N	424	3:32PM 7/8
RIGHTEOUS ROOM	1051 PONCE DE LEON AVE	N	423	3:30PM 7/8
MOONDOGS	3177B - 3179 PEACHTREE RD	N	459	8:00PM 7/11
BUCKET SHOP CAFE	3475 LENOX ROAD	N	494	10:30AM 7/22
PARK BENCH	34 IRBY AVE NW	N	452-453	7:32PM 7/11
THE HOLE IN THE WALL	3177 PEACHTREE RD NE	N	458	8:01PM 7/11
APRES DIEM	931 MONROE DR NE	N	473	12:20PM 7/19
GORDON BIERSCH BREWERY RESTRAU	848 PEACHTREE ST NE	N	413	5:38PM 7/7
SHOUT	1197 PEACHTREE ST STE 526	N	411	5:30PM 7/7
MID CITY CAFE	845 SPRING ST NW STE D1	Y	469	11:58AM 7/19
MIDTOWN TAVERN	554 PIEDMONT AVE NE STE B	N	422	6:45PM 7/7
INDIGO BAR	619 EDGEWOOD AVE SE	N	421	6:33PM 7/7
THE WARREN	818 N HIGHLAND AVE NE	N	397-398	5:52PM 7/1
LOCA LUNA	550C AMSTERDAM AVE NE	N	470	12:07PM 7/19
HERETIC	2069 CHESHIRE BRIDGE RD NE	N	495	10:43AM 7/22
OSCAR'S OF ATLANTA	1510 PIEDMONT AVE NE	N	501	11:06AM 7/22
ATLANTA EAGLE	306 PONCE DE LEON AVE NE	N	429-430	4:12PM 7/8
DECKARD'S KITCHEN & KEGS	650 PONCE DE LEON AVE NE	N	427	4:00PM 7/8
MJQ CONCOURSE/Drunken Unicorn	736 PONCE DE LEON AVE NE	N	425	3:30PM 7/8
GIBNEY'S PUB	231 PEACHTREE CTR AVE STE A07	N	414	5:57PM 7/11
HIGH VELOCITY	265 PEACHTREE CENTER AVE	N	415-417	5:59PM 7/11
BOTTLE BAR	268 E PACES FERRY RD NE	N	455	7:41PM 7/11
SIR WINSTON CHURCHILLS	3223 CAINS HILL PL NW	N	454	7:33PM 7/11

BELUGA MARTINI BAR/ROSEBAR	3115 PIEDMONT RD ST B-101	N	457	7:50PM 7/11
ROCKY MOUNTAIN PIZZA COMPANY	1005 HEMPHILL AVE NW	N	468	11:50AM 7/19
CENTRAL CITY TAVERN	1801 HOWELL MILL RD NW	N	463	11:23AM 7/19
PRICKLY PEAR TAQUERIA	950 W PEACHTREE ST NW	N	432	4:19PM 7/8
SUTRA LOUNGE LLC	1136 CRESCENT AVE NE	N	435	4:25PM 7/8
COSMOPOLITAN	45 13TH ST NE	N	437	4:28PM 7/8
BLIND WILLIES INC	828 NORTH HIGHLAND AVE	N	392	5:49PM 7/1
NONI'S	357 EDGEWOOD AVE SE	N	488	9:46AM 7/21
EDGEWOOD CORNER TAVERN	464 EDGEWOOD AVE SE	N	486	9:42AM 7/21
KROG BAR	112 KROG ST NE	N	479	9:21AM 7/21
CAFE CIRCA	464 EDGEWOOD AVE SE	N	487	9:43AM 7/21
FONTAINES OYSTER HOUSE INC	1026 1/2 N HIGHLAND AVE NE	N	388	5:43PM 7/1
DIESEL	870 N HIGHLAND AVE NE	N	391	5:47PM 7/1
HIGHLAND CIGAR CO.	245 N HIGHLAND AVE NE STE 140	N	408-409	6:25PM 7/1
HAND IN HAND	752 N HIGHLAND AVE NE	Y	401	6:05PM 7/1
OSTERIA 832	832 N HIGHLAND AVE NE	Y	394-395	5:49PM 7/1
LA FONDA	1025 HOWELL MILL RD NW	N	467	11:43AM 7/19
ORMSBY'S	1170 HOWELL MILL RD NW	N	465	11:40AM 7/19
NORTHSIDE TAVERN	1058 HOWELL MILL RD NW	N	466	11:41AM 7/19
WEST MIDTOWN CORNER TAVERN	1133 HUFF RD NW	N	464	11:31AM 7/19
THE HIGHLANDER	931 MONROE DR NE	N	474	12:21PM 7/19
PARK TAVERN	500 10TH ST NE	N	472	12:16PM 7/19
SMITH'S OLDE BAR	1580 PIEDMONT RD NE	N	499	11:02AM 7/22
ROXX	1824 CHESHIRE BRIDGE RD NE	N	497	10:52AM 7/22
BURKHART'S PUB	1492-F PIEDMONT RD NE	N	500	11:05AM 7/22
AMSTERDAM CAFÉ	502 AMSTERDAM AVE NE	N	471	12:13PM 7/19
MODEL T	699 PONCE DE LEON AVE	N	428	4:08PM 7/8
FELIXS ON THE SQUARE	1510 PIEDMONT RD NE STE G	N	502	11:07AM 7/22
BJ Rooster	2345 Cheshire Bridge Rd	N	496	10:47AM 7/22
Woof's on Piedmont	2425 *Piedmont* Rd NE	N	498	10:56AM 7/22
FRIENDS ON PONCE	736 PONCE DE LEON AVE NE	N	426	3:39PM 7/8
TIN LIZZY'S GRANT PARK	415 Memorial Dr	N	485	9:38AM 7/21
MATADOR MEXICAN CANTINA	925 GARRETT ST SE	N	492	10:07AM 7/21
VICKERY'S GLENWOOD PARK	933 GARRETT ST UNIT 101-102	N	491	10:06AM 7/21
THE ALBERT	CITY of ATLANTA	N	489	9:54AM 7/21
EL MYR RESTAURANT	1091 EUCLID AVE NE	N	478	9:16AM 7/21
WRECKING BAR	292 MORELAND AVE NE	N	490	9:58AM 7/21
PURE TAQUERIA	300 N HIGHLAND AVE NE	N	405	6:15PM 7/21
P'CHEEN	701-5 HIGHLAND AVE	N	406-407	6:17PM 7/1
MILLTOWN ARMS	180 CARROLL ST SE	N	481	9:29AM 7/21
Six Feet Under	437 MEMORIAL DR SE	N	484	9:37AM 7/21

REPUBLIC SOCIAL HOUSE	437C MEMORIAL DR SE	N	483	9:36AM 7/21
AGAVE	242 BOULAVARD SE	N	482	9:31AM 7/21
97 ESTORIA	727 WYLIE ST SE	N	480	9:24AM 7/21
EUCLID AVE YACHT CLUB	1136 EUCLID AVE NE	N	475	9:09AM 7/21
LITTLE 5 CORNER TAVERN	1174 EUCLID AVE NE	N	476	9:11AM 7/21
THE VORTEX BAR & GRILL	438 MORELAND AVE NE	N	493	10:18AM 7/21
THE PORTER	1156 EUCLID AVE NE	N	477	9:13AM 7/21
ANATOLIA CAFÉ	52 PEACHTREE ST NW	N	420	6:16PM 7/7
SIDEBAR	79A POPLAR ST NW	N	419	6:11PM 7/7
CAFE INTERMEZZO	141 Margaret Mitchell Square	Y	418	6:07PM 7/7
THE POOL HALL	30 IRBY AVE NW	N	451	7:30PM 7/11
FIVE PACES INN	41 IRBY ST	N	450	7:29PM 7/11
RED DOOR TAVERN	3180 ROSWELL RD NW	N	446	7:11PM 7/11
GYPSY STAG~now Hangovers	3188 ROSWELL RD NW	N	444	7:09PM 7/11
STOUT IRISH SPORTS BAR	56 E ANDREWS DR NW STE 15 & 16	N	449	7:25PM 7/11
STOOGES	2020 HOWELL MILL RD NW	N	461	11:11AM 7/19
MR C'S NEIGHBORHOOD BAR & GRIL	1983 HOWELL MILL ROAD	N	462	11:15AM 7/19
BLACK BEAR TAVERN	1931 PEACHTREE RD NE	N	460	8:12PM 7/11
Johnny's HIDEAWAY	3771 Roswell Rd NE	N	443	7:00PM 7/11
Divan	3125 PIEDMONT RD NE	N	456	7:47PM 7/11
KRAMER'S	3167 ROSWELL RD NE	N	445	7:10PM 7/11
The Ivy	3717 ROSWELL RD	N	448	7:19PM 7/11
BUCKHEAD SALOON	3227 ROSWELL RD NE	N	447	7:14PM 7/11
DEADWOOD SALOON	66 12TH ST NE	N	436	4:27PM 7/8
CHARLIE G'S 11TH STREET PUB	1041 W PEACHTREE ST NW	Y	433-434	4:22PM 7/8
THE VORTEX BAR & GRILL	878 PEACHTREE ST NE LBBY 4	N	412	5:36PM 7/7
MARLOW'S TAVERN	950 W PEACHTREE ST NW	N	431	4:17PM 7/8
DARK HORSE TAVERN	816 N HIGHLAND AVE NE	N	396	5:52PM 7/1
NEIGHBORS PUB	752-C N HIGHLAND AVE NE	N	402	6:06PM 7/1
LIMERICK JUNCTION PUB	822 N HIGHLAND AVE NE	N	393	5:50PM 7/1
ATKINS PARK RESTAURANT	794 N HIGHLAND AVE NE	Y	399(R), 400(B)	6:00PM 7/1
HIGHLAND TAP	1026 N HIGHLAND AVE NE	Y	390	5:43PM 7/1

Table 6

Photographed Venues with Air Quality Data

Venue ID	Venue	Smoking Allowed	Mean $PM_{2.5}$	Average # People	Average # Cigarettes	# Sample Minutes	Signage
100	KROG BAR	0	69.081	26	0	32	0
101	CAFE CIRCA	0	19.53	75	0	31	0
102	HAND IN HAND	0	13.102	96	0	34	1
103	OSTERIA 832	0	11.97	6	0	31	1
104	LA FONDA	0	25.328	50	0	32	0
105	ORMSBY'S	0	10.126	120	0	30	0
106	WRECKING BAR	0	11.41	68	0	31	0
107	PURE TAQUERIA	0	9.93	31	0	30	0
108	P'CHEEN	0	74.135	21	0	81	0
109	Six Feet Under	0	51.045	128	0	30	0
110	REPUBLIC SOCIAL HOUSE	0	25.336	32	0	62	0
111	AGAVE	0	59.316	34	0	43	0
112	CAFE INTERMEZZO	0	8.916	17	0	43	1
113	The Ivy	0	36.697	38	0	30	0
114	BUCKHEAD SALOON	0	33.449	24	0	35	0
115	HIGHLAND TAP	0	26.145	50	0	63	1
201	NONI'S	1	135.58	46	1.6	31	0
202	EDGEWOOD CORNER TAVERN	1	111.68	36	3.3	40	0
203	FONTAINES OYSTER HOUSE INC	1	30.093	55	0	48	0
204	DIESEL	1	105.99	19	3.3	31	0
205	HIGHLAND CIGAR CO.	1	804.207	35	12	33	1
206	NORTHSIDE TAVERN	1	54.411	20	3	29	0
207	WEST MIDTOWN CORNER TAVERN*	1	70.458	20	4	49	0
208	THE HIGHLANDER	1	39.527	16	1	45	0
209	PARK TAVERN	1	15.837	25	0	60	0
210	SMITH'S OLDE BAR	1	25.105	53	1	41	0
211	ROXX	1	67.33	40	0.6	63	0
212	BURKHART'S PUB	1	261.85	138	18	31	0
213	AMSTERDAM CAFÉ	1	99.49	45	2.2	31	0
214	MODEL T	1	70.142	11	1.5	30	0
215	FELIXS ON THE SQUARE	1	91.004	42	5	30	1
216	FRIENDS ON PONCE	1	256.11	26	3.8	31	1
219	THE ALBERT	1	106.425	54	5.6	25	1
220	TIN LIZZY'S GRANT PARK	1	22.069	76	0.6	28	0
221	97 ESTORIA	1	47.332	15	0.6	56	0

222	MATADOR MEXICAN CANTINA	1	54.028	29	0	30	0
223	EL MYR RESTAURANT	1	204.274	76	4.3	30	0
224	MILLTOWN ARMS	1	61.715	23	3.3	42	0
225	EUCLID AVE YACHT CLUB	1	60.977	27	3.3	37	1
226	LITTLE 5 CORNER TAVERN	1	20.672	11	1	29	0
228	THE PORTER	1	80.095	40	0	56	0
229	ANATOLIA CAFÉ	1	58.764	31	0	32	0
230	SIDEBAR	1	10.978	7	0	35	0
231	THE POOL HALL	1	46.914	14	1	32	0
232	FIVE PACES INN	1	41.135	25	1	33	0
233	RED DOOR TAVERN	1	115.313	25	2.3	33	0
235	STOUT IRISH SPORTS BAR	1	54.32	11	1.3	31	0
236	STOOGES	1	4.254	33	3.3		0
237	MR C'S NEIGHBORHOOD BAR&GRILL	1	20.335	18	3.3	30	0
239	KRAMER'S	1	16.909	8	0.33	24	0
241	DIVAN	1	122.74	27	10.3	31	0
242	CHARLIE G'S 11TH STREET PUB	1	106.776	13	9	36	1
243	DEADWOOD SALOON	1	18.59	4	0.66	41	0
244	THE VORTEX BAR & GRILL	1	62.804	131	80	37	1
245	MARLOW'S TAVERN	0	12.065	93	3.3	26	0
246	DARK HORSE TAVERN	1	156.236	22	2	41	0
247	NEIGHBORS PUB	1	98.38	8	11	31	0
248	LIMERICK JUNCTION PUB	1	55.072	100	4	29	0
249	ATKINS PARK RESTAURANT	1	59.72	34	0.33	31	1
	Mean Total $PM_{2.5}$ =		**75.3088**		**3.595254**	**= Mean Total Cigarettes**	
		Mean # of Patrons=		**40.6441**			

Table 7

Venues In Compliance

Venue ID	Venue	Phone Call, Smoking Status	Mean $PM_{2.5}$	Average # People	Average # Cigarettes	# Sample Minutes	Signage	Smoking Status
102	HAND IN HAND	N	13.102	96	0	34	Y	NON
103	OSTERIA 832	N	11.97	6	0	31	Y	NON
112	CAFE INTERMEZZO	N	8.916	17	0	43	Y	NON
115	HIGHLAND TAP	N	26.145	50	0	63	Y	NON
219	THE ALBERT	Y	106.425	54	5.6	25	Y	NON
249	ATKINS PARK RESTAURANT	Y	59.72	34	0.33	31	Y	NON
	Mean Total $PM_{2.5}$ =		**37.713**		**0.98833333**	**= Mean Total Cigarettes**		
		Mean # of Patrons=		**42.8333**				
205	HIGHLAND CIGAR CO.	Y	804.207	35	12	33	Y	Y
215	FELIXS ON THE SQUARE	Y	91.004	42	5	30	Y	Y
216	FRIENDS ON PONCE	Y	256.11	26	3.8	31	Y	Y
225	EUCLID AVE YACHT CLUB	Y	60.977	27	3.3	37	Y	Y
242	CHARLIE G'S 11TH STREET PUB	Y	106.776	13	9	36	Y	Y
244	THE VORTEX BAR & GRILL	Y	62.804	131	80	37	Y	Y
	Mean Total $PM_{2.5}$ =		**230.313**		**18.85**	**= Mean Total Cigarettes**		
		Mean # of Patrons=		**45.6667**				